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A REDESCRIPTION OF *ORDOBREVIA NUBIFERA* (FALL) (COLEOPTERA: ELMIDAE)

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Abstract.—Newly found variation in the size, sculpturing and color of *Ordobrevia nubifera* (Fall) is described. This variation may be linked to varying larval developmental rates.

Key Words.—Insecta, Coleoptera, Elmidae, *Ordobrevia,* variation, development

The genus *Ordobrevia* was erected in 1953 by Sanderson, with *Stenelmis nubifera* Fall, 1901 as its type species. At that time, *S. nubifera* was the sole member of the "*nubifera* group" of *Stenelmis* (Sanderson 1938). Twelve more species of *Ordobrevia* have been described since 1953. Four are from the Palaearctic region (Japan) and eight are from the Oriental region (Brown 1981). It thus appears that *Ordobrevia nubifera* represents an intrusion of the Palaearctic/Oriental fauna into the Nearctic fauna. *Zaitzevia* (Elmidae) and *Eubrianax* (Psephenidae) show similar intrusions (Brown 1981).

Ordobrevia nubifera occurs only in North America, and its known range extends from California to Washington (Brown 1972). More is known about California populations than those in other areas. Within California, *O. nubifera* occurs widely throughout all the various mountain ranges. It inhabits streams of all sizes from first order to much larger. It seems to prefer microhabitats with faster flows and coarser substrates.

Several years ago I found what seemed to be a new species of *Ordobrevia.* It was larger and more robust, and it had more coarse granulation and a distinctly different color pattern. I came embarassingly close to describing it as a new species. Subsequent collections have shown it to be the end of a previously unknown range of variation within *O. nubifera.* Recent studies of the elmid fauna of Taiwan by M. L. Jang and P. S. Yang, and an ongoing revision of *Stenelmis* by Kurt Schmude have called into question the status and identity of *Ordobrevia.* Because of these two recent studies and discovery of additional intraspecific variation in *O. nubifera,* I decided to review what was known about *Ordobrevia nubifera.*

Existing work that illustrates *O. nubifera* includes the following: for larvae, ninth abdominal tergum (Sanderson 1953: fig. 24), mesothorax (Leech & Chandler 1956: fig. 13:51h), habitus (Brown 1972: figs. 163 and 164), head (White et al. 1984: fig. 19.246); and for adults, aedeagus (Sanderson 1938: fig. 1), antenna (Sanderson 1938: fig. 7), elytral pattern (Sanderson 1938: fig. 19), elytron (Leech & Chandler 1956: fig. 13:52g), and habitus (Brown 1972: fig. 25, White et al. 1984: fig. 19.272).

ORDOBREVIA NUBIFERA (FALL) 1901

Redescription.—(both sexes, except as indicated).—BODY: Body elongate, slender (Fig. 1) to robust (Fig. 2), parallel sided; sculpturing and granulation slight to very coarse. Pronotum narrower than

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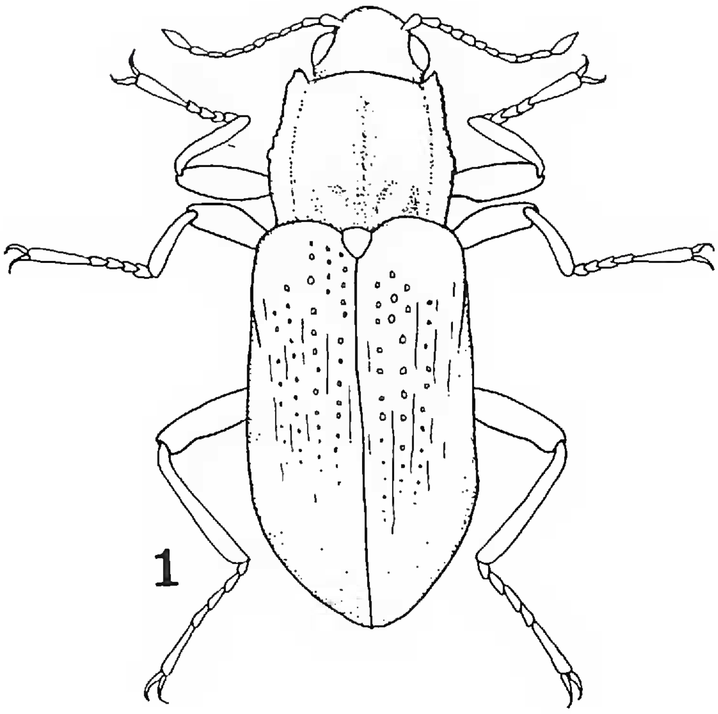

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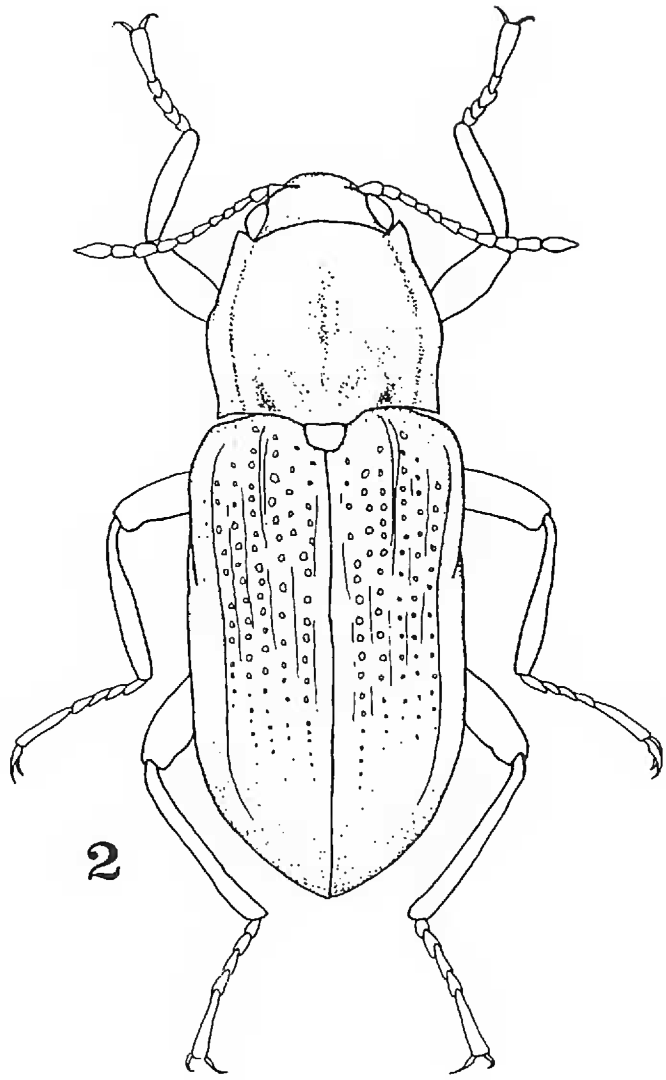

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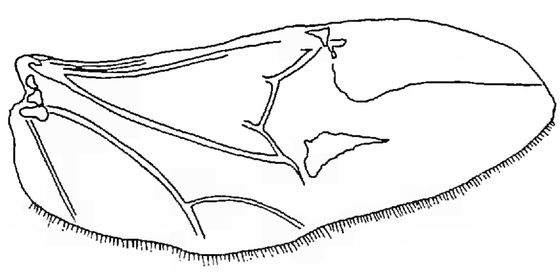

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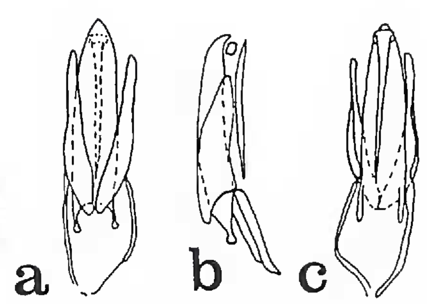

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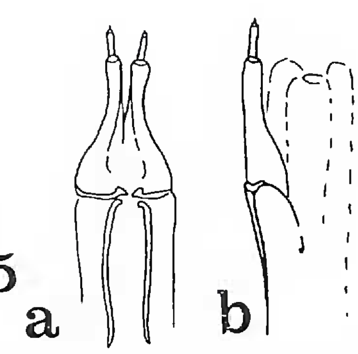

Figures 1–5. *Ordobrevia nubifera.* Figure 1. Typical morph. Figure 2. Large morph. Figure 3. Right wing. Figure 4. Aedeagus (a—dorsal view, b—lateral view, c—ventral view). Figure 5. Ovipositor (a—dorsal view, b—lateral view).

elytra. Body uniformly brown to testaceous, with a transverse yellow band across the middle of the elytra. Length 2.0–2.6 mm; width 0.8–1.2 mm. HEAD: Head covered with granules. Granules longitudinally elongate on the epicranial surface, less elongate elsewhere. Antennal ridges prominent dorsally. Fronto-clypeal suture absent. Clypeus with coarse setae on apical margin. Labrum dark brown, shiny, coriaceous; apical margin with thick medially curved setae. Mandibles prominent; tips trifid. Palpi three-segmented, last segment broad and apically truncate; labial palpi lighter than maxillary palpi. Antennae eleven-segmented; segments one to six narrow; segments seven to eleven apically widened forming a weakly defined club, possessing lateral tufts of whitish setae. PRONOTUM: Pronotum usually wider than long, width greatest just behind middle. Base of pronotum wider than apex, lateral margins sinuate and weakly serrate. Entire surface covered with close-set granules and punctures. Median longitudinal sulcus in basal three-fourths of pronotum; sulcus deeper anteriorly. Base of median sulcus with two depressions on each side. ELYTRA: Elytra with punctae arranged in striae. Punctures smaller and less distinct in apical one-third, obsolete at tip. Surface between punctures smooth and shiny to coarsely granulate. First and accessory striae join in basal one-fourth. Intervals raised; third intervals carinate in basal third; sixth intervals forming sublateral carinae that reach almost to apex. Humeri distinct and produced beyond basal pronotal margins. Epipleura extend almost to tip of elytra. WINGS: Wings entire (Fig. 3); posterior edge with fringe of fine setae. Venation reduced. VENTER: Hypomera, pro-, meso-, and metasternum covered with granules separated by less than their own width. Prosternal margin projecting anteriorly under head and labium. Prosternal process parallel-sided, projecting beyond coxae, with apex apically rounded. Mesosternum very short, broadly truncate apically, reaching only to middle of mesocoxae; median longitudinal sulcus present. Metasternum similar to mesosternum but longer, with apex broadly emarginate. Abdomen with five visible segments; males with segment V with lateral margins produced into short wide spines and narrowly emarginate apically; females with lateral margins only weakly spiniform and apex broadly emarginate. Granules on segment I rounded, separated by own width, those on segments II–V elongate, more widely separated. All segments with lateral flanges closely fitting into the epipleura. LEGS: Pro- and mesocoxae rounded, metacoxae transverse. Metathoracic legs slightly longer than others. Granules on coxae rounded, close-set. Granules on trochanters 2.0 × as long as wide. Granules on femora and tibiae very elongate, arranged parallel to the axes of the legs. GENITALIA: Male genitalia (Fig. 4) with parameres shorter than median piece; accessory sclerites include a longitudinally elongate ventral sclerite and a short transverse rectangular sclerite located between the tips of the median piece and the ventral piece; basal piece weakly sclerotized, varying from a flattened U-shape to a complete ring. Female genitalia (Fig. 5) typical for elmids.

Discussion

This species shows considerably more size variation than previously stated. However, I think that size ranges given in the literature are often the result of repetition of earlier measurements that may have been based on relatively few specimens. The morph that I earlier almost mistook for a new species is now considered to be the upper range of size for *O. nubifera.* It is longer and much wider than "typical" specimens. A more strongly developed granulation, punctation and sculpturing, and a trend toward uniformly dark brown color is correlated with increasing size. Other morphologic characters remain unchanged, albeit somewhat larger in proportions.

There seem to be higher percentages of larger individuals of *Ordobrevia nubifera* in populations in the northern Coastal Mountains and the Warner Mountains than in other parts of California (unpublished data). These larger individuals of *O. nubifera* often occur with "typical" specimens. However, the larger morph is a larger percentage of the population in rather cold streams, or in areas that experience rather cold winter weather. I now think that they represent larvae in which the normal developmental rate was retarded allowing the normal growth rate to produce a larger-than-normal individual. Larger larvae, of course, mean larger adults. Differential manipulation of developmental rates has been shown to cause different sized morphs in the worker caste of ants (Oster & Wilson 1978). I have found similar, larger-than-normal individuals in several other elmid genera. Retardation of developmental rates could be a result of intrinsic factors (e.g., genetic recombinations, random mutations) or extrinsic factors (e.g., cold temperatures, limited supplies of specific nutrients). My experiences lead me to favor the cold temperatures as the major influencing factor. Some described variations in *Microcylloepus,* another elmid, appear to be temperature correlated (Shepard 1990). However, in this case, smaller-than-normal individuals (and species) occur in warmer habitats. There, I believe, the developmental rate is accelerated while the growth rate remains unaffected. Thus the individuals mature at a smaller body size. More study is warranted concerning the influences of varying temperatures upon life cycle events in natural populations.

My near description of a new species of *Ordobrevia* should alert other taxonomists to sample extensively and pay more attention to intraspecific variation. Even though I had previously collected and identified hundreds of the "typical" *O. nubifera,* I did not have an accurate idea of the total intraspecific variation until I collected in streams that were perennially cold, or were very cold during large parts of the year. I am also reminded of the necessity of obtaining population samples large enough to contain the rarer morphs within a population. This is especially a problem when sampling aquatic insects in such an ecologically diverse area as California. Larger population samples have led me to question the validity of several California elmid species.

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